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**Notes:**

1. Untranslatable words are replaced with asterisks (\*\*\*\*).
2. Texts in the figures are not translated and shown as is.

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**CLAIM + DETAILED DESCRIPTION**

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**[Claim(s)]**

[Claim 1] (A) The weight average molecular weight of the polystyrene conversion obtained by the gel permeation chromatography is  $4.0 \times 10^5$  to  $3.0 \times 10^6$ . It is. The styrene butadiene (copolymer a) 100 mass part whose amount of vinyl combination of 10 - 50 mass % and a butadiene part the amount St of combined styrene (a) is 20 to 70%, (B) The weight average molecular weight of the polystyrene conversion obtained by the gel permeation chromatography is  $5.0 \times 10^3$  to  $2.0 \times 10^5$ . while it is and the amount St of combined styrene (b) is 25 - 70 mass % \*\*\*\* styrene butadiene (copolymer b) 10-200 to which it has the relation which fills the following formula (I), and hydrogenation of the 60% or more of the double bond of a butadiene part was carried out -- mass -- a part -- And the rubber constituent for tires which resin and the weight average molecular weight which have the adhesion grant nature to (C) rubber constituent blend at least one sort chosen from the liquefied polymer of 1,000-50,000, and is characterized by things.

$St(b) \geq St(a) + 10 \dots (I)$

[Claim 2] (B) The rubber constituent for tires according to claim 1 characterized by the amount St of combined styrene of an ingredient (b) being 30 - 60 mass %.

[Claim 3] (B) The rubber constituent for tires according to claim 1 or 2 characterized by carrying out hydrogenation of the 80% or more of the double bond of the butadiene part of an ingredient.

[Claim 4] (B) The rubber constituent for tires according to claim 1 to 3 characterized by the loadings of an ingredient being a 20 - 100 mass part to a (A) ingredient 100 mass part.

[Claim 5] The rubber constituent for tires according to claim 1 to 4 characterized by said formula (I) being the following type.

$St(b) \geq St(a) + 15 \dots (I)$

[Claim 6] The rubber constituent for tires according to claim 1 to 5 characterized by the

aforementioned (C) ingredients being a natural resin and/or a synthetic resin.

[Claim 7] The rubber constituent for tires according to claim 6 characterized by said synthetic resin being at least one sort chosen from the group which consists of oil system resin, phenol system resin, Carboniferous system resin, and xylene system resin.

[Claim 8] The rubber constituent for tires according to claim 7 which is petroleum resin with which said oil system resin denatured with the unsaturated alicyclic compound, the compound which has a hydroxyl group, or the unsaturated-carboxylic-acid compound.

[Claim 9] C in which said oil system resin denatured with the unsaturated alicyclic compound -- the rubber constituent for tires according to claim 8 characterized by being petroleum resin 9 system.

[Claim 10] The rubber constituent for tires according to claim 9 characterized by said unsaturated alicyclic compound being JSHIKUROPENTAJIEN.

[Claim 11] C in which said oil system resin denatured with the compound which has a hydroxyl group -- the rubber constituent for tires according to claim 8 characterized by being petroleum resin 9 system.

[Claim 12] The rubber constituent for tires according to claim 11 characterized by the compound which has said hydroxyl group being a phenol system compound.

[Claim 13] C in which said petroleum resin denatured with the unsaturated-carboxylic-acid compound -- the rubber constituent for tires according to claim 8 characterized by being petroleum resin 9 system.

[Claim 14] The rubber constituent for tires according to claim 13 characterized by said unsaturated-carboxylic-acid compound being maleic acid.

[Claim 15] The rubber constituent for tires according to claim 6 to 14 characterized by the softening temperature of said synthetic resin and/or a natural resin being 200 degrees C or less.

[Claim 16] The rubber constituent for tires according to claim 1 to 15 characterized by carrying out 10-150 mass part combination of the aforementioned (C) ingredient to a rubber ingredient 100 mass part.

[Claim 17] Furthermore, the rubber constituent for tires according to claim 1 to 16 characterized by blending a bulking agent.

[Claim 18] The rubber constituent for tires according to claim 17 which is at least one sort as which said bulking agent is chosen from the inorganic compound expressed with carbon black, silica, and the following type (II).

$mM_1$  and  $xSiO_y-zH_2O \dots$  (II)

at least one metal with which  $M_1$  is chosen from aluminum, Mg, Ti, Ca, and Zr among a formula (II) -- It is carbonate of a metal oxide or metal hydroxide and those hydration things, or such metal, and m, x, y, and z are the integer of 1-5, the integer of 0-10, the integer of 2-5, and

the integer of 0-10, respectively.

[Claim 19] The tire characterized by using the rubber constituent for tires according to claim 1 to 18.

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[Detailed Description of the Invention]

[0001]

[Field of the Invention] About the tire which used a rubber constituent and it, in more detail, also when this invention is used for a tire, and tread skin temperature is low, it relates to the pneumatic tire using the rubber constituent and it which can demonstrate good grip performance.

[0002]

[Description of the Prior Art] High grip nature is required of the tread rubber of the tire of which a run at a high speed is required. In order to obtain high grip nature conventionally, methods, such as the method of making it into the combination system high-filled up with the method, the softener, and carbon black which use styrene butadiene copolymer rubber (SBR) with high styrene ingredient content, and the method of using small carbon black of particles, were taken.

[0003] However, generally, since glass transition temperature was high, SBR with high styrene ingredient content had the problem that the temperature dependence of the physical properties of a rubber constituent became large in the neighborhood of the tire temperature at the time of a run, and the performance change to a temperature change became large.

[0004] Moreover, when the loadings of carbon black or a softener are increased or small carbon black of particle diameter is used, it has a bad influence on distribution of carbon black, and there is a problem that abrasion resistance falls. Furthermore, if the amount of substitution becomes not much abundant also in equivalent substitution combination of high softening temperature resin and processing oil, it is the influence of high softening temperature resin, and temperature dependence becomes size and is inconvenient similarly.

[0005] Let SBR with high styrene ingredient content be a rubber ingredient based on the above result. The way petroleum resin and softening temperature which make C9 aromatic-series system resin the main ingredients blend the mixture of coumarone-indene resin below 40 degrees C in the used system (for example) How to use together small carbon black of patent-documents 1 reference and the diameter of a particle, and resin of an ARUKIRU phenol system (for example) the method (for example, refer to patent documents 3) of blending C5 fraction, the styrene, or copolymerization resin of vinyltoluene obtained by the thermal cracking of naphtha to the rubber ingredient of patent-documents 2 reference and a JIEN system etc. -- although the method was tried, the effect was still insufficient.

[0006]

[Patent documents 1] JP,H5-214170,A (the 1st page)

[Patent documents 2] JP,H6-200078,A (the 1st page)

[Patent documents 3] JP,H9-328577,A (the 1st page)

[0007]

[Problem(s) to be Solved by the Invention] There is the purpose of this invention in offering the tire using the rubber constituent for tires and this suitable for treads excellent in shop work nature while it makes temperature dependence small and has high grip nature.

[0008]

[Means for Solving the Problem] As a result of repeating examination wholeheartedly that this invention person should attain the above-mentioned purpose, were obtained by the (A) gel permeation chromatography. The weight average molecular weight of polystyrene conversion is  $4.0 \times 10^5$  to  $3.0 \times 10^6$ . It is. The styrene butadiene (copolymer a) 100 mass part whose amount of vinyl combination of 10 - 50 mass % and a butadiene part the amount St of combined styrene (a) is 20 to 70%, (B) The weight average molecular weight of the polystyrene conversion obtained by the gel permeation chromatography is  $5.0 \times 10^3$  to  $2.0 \times 10^5$ . while it is and the amount St of combined styrene (b) is 25 - 70 mass % \*\*\*\* styrene butadiene (copolymer b) 10-200 to which it has the relation which fills the following formula (I), and hydrogenation of the 60% or more of the double bond of a butadiene part was carried out -- mass -- a part -- And the rubber constituent for tires with which resin and the molecular weight which have the adhesion grant nature to (C) rubber constituent blend at least one sort chosen from the liquefied polymer of 1,000-50,000 finds out attaining the above-mentioned purpose, and completes this invention.

$St(b) \geq St(a) + 10 \dots (I)$

[0009]

[Embodiment of the Invention] As for the rubber constituent of this invention, the weight average molecular weight of the polystyrene conversion obtained by the gel permeation chromatography (GPC:gel permeation chromatography) is  $4.0 \times 10^5$  to  $3.0 \times 10^6$ . It is. The amount St of combined styrene (a) makes the styrene butadiene copolymer (a) whose amount of vinyl combination of 10 - 50 mass % and a butadiene part is 20 to 70% indispensable constituent elements. When the average molecular weight of a copolymer (a) is less than  $4.0 \times 10^5$ , if the destructive characteristic of a rubber constituent falls and  $3.0 \times 10^6$  is exceeded, the viscosity of polymerization solution will become high too much, and productivity will become low. Moreover, if the destructive characteristic falls under by 10 mass % and the amount of combined styrene of a copolymer (a) exceeds 50 mass %, abrasion resistance will fall. Furthermore, if grip performance falls at less than 20% and the amount of vinyl combination of a butadiene part exceeds 70%, an antiwear characteristic will fall. In addition,

the amount of vinyl combination of the same viewpoint to a butadiene part has 30 to 60% of desirable range.

[0010] Next, as for the rubber constituent of this invention, the weight average molecular weight of the polystyrene conversion obtained by GPC is  $5.0 \times 10^3$  to  $2.0 \times 10^5$ . It is. The amount St of combined styrene (b) makes the \*\*\*\* styrene butadiene copolymer (b) to which hydrogenation of 25 - 70 mass % and the 60% or more of the double bond of a butadiene part was carried out indispensable constituent elements. If the weight average molecular weight of a copolymer (b) deviates from the above-mentioned range, dry grip nature will fall. Moreover, also when the amount of combined styrene is under 25 mass %, dry grip nature falls, since it will become resin-like if 70 mass % is exceeded, a constituent becomes hard, and dry grip nature falls too. Furthermore, when hydrogenation of the 60% or more of the double bond of a butadiene part is not carried out, \*\*\*\*\* with a copolymer (b) happens and sufficient grip nature is not obtained. It is still more desirable that hydrogenation of the 80% or more of the double bond of a butadiene part is carried out from this viewpoint. In addition, a copolymer (b) has an effect as a softener of rubber, and it enables kneading of a rubber constituent etc., without using the aroma tick oil usually used as a softener of rubber. Moreover, you may add at the time of rubber compounding (the time of manufacture of a master batch is included), and this copolymer (b) may be added like expansion oil at the time of manufacture of rubber.

[0011] Although the rubber constituent of this invention needs to blend the (B) ingredient at a rate of a 10 - 200 mass part to a (A) ingredient 100 mass part This is because under 10 mass parts of improvement of intensity and dry grip nature are inadequate, Mooney viscosity will become low and productivity will worsen, if 200 mass parts are exceeded. The combination rate of the (B) ingredient has the more desirable range of a 20 - 100 mass part from this viewpoint to a (A) ingredient 100 mass part.

[0012] Moreover, as for the rubber constituent of this invention, it is indispensable that the amount St of combined styrene (a) of a copolymer (a) and the amount St of combined styrene (b) of a copolymer (b) have the relation which fills the following formulas (I).

$$St(b) \geq St(a) + 10 \dots (I)$$

St (a) expresses the amount of combined styrene (mass %) of a copolymer (a) among [type, and St (b) expresses the amount of combined styrene (mass %) of a copolymer (b). ]

A formula (I) serves as an indicator of the compatibility of a copolymer (a) and a copolymer (b), and sufficient compatibility is not acquired when the difference of the amount of combined styrene of a copolymer (b) and a copolymer (a) is less than 10%. As a result, when BURIDO on the surface of rubber of the (B) ingredient happens and the tread rubber of a tire is constituted, sufficient adhesion with other members is not obtained, and destructive intensity also falls. When fulfilling the conditions of a formula (I), the rubber constituent which has the outstanding grip nature and intensity is obtained, but it is desirable that the difference of the

amount of combined styrene of a copolymer (b) and a copolymer (a) is 15% or more further.

[0013] The copolymer (a) can carry out the copolymerization of butadiene and the styrene by anionic polymerization under existence of ether or a tertiary amine using a lithium system polymerization initiator in a hydrocarbon solvent. Although not limited especially as a hydrocarbon solvent, aromatic hydrocarbon, such as aliphatic hydrocarbon, such as alicyclic hydrocarbon, such as cyclo HEKISAN and a MECHIRU cyclo pen tongue, a pen tongue, HEKISAN, and Cheb Than, benzene, and toluene, etc. can be used. Moreover, although there is no restriction in particular as a lithium system catalyst and it can choose from an organic lithium compound, lithium amide, lithium amide tin, etc. suitably An organic lithium compound has it and Ethyl lithium, pro pill lithium, [ desirable ] ARUKIRU lithium, such as n-butyl lithium, sec-butyl lithium, and t-butyl lithium, Alkylene dilithium, such as ARUKE nil lithium, such as ARIRU lithium, such as phenyl lithium, and vinyl lithium, tetramethylen dilithium, and pentamethylene dilithium, etc. is mentioned. Also in this, n-butyl lithium, sec-butyl lithium, t-butyl lithium, and tetramethylen dilithium are desirable, and n-butyl lithium is especially desirable.

[0014] On the other hand, a \*\*\*\* styrene butadiene copolymer (b) can be obtained by \*\*\*\*(ing) the polymer compounded with either of the same methods as a copolymer (a) by a usual state method. Platinum, the palladium catalyst which were supported to alumina, silica alumina, activated carbon, etc. as a hydrogenation catalyst, for example, A nickel catalyst, the Cobalt system catalyst, the Raney nickel catalyst, etc. which were supported to diatomite, alumina, etc. are mentioned, and it is usually carried out under about 1-100-atmosphere pressurization hydrogen as reaction conditions.

[0015] The rubber constituent of this invention makes it indispensable for resin and the molecular weight which have the adhesion grant nature to a rubber constituent as a (C) ingredient in a copolymer (a) and a copolymer (b) to blend at least one sort chosen from the liquefied polymer of 1,000-50,000. Generally, molecular weights are thousands of [ hundreds to ] thermoplastics, the resin which has the adhesion grant nature to a rubber constituent can mean the resin which gives adhesiveness by blending with crude rubber or a synthetic rubber, and various natural resins and synthetic resins can be used. Specifically, synthetic resins, such as natural resins, such as rosin system resin and TERUPEN system resin, oil system resin, phenol system resin, Carboniferous system resin, and xylene system resin, can be used. As rosin system resin, gum rosin, tall oil rosin, wood rosin, They are mentioned by the glycerin of hydrogenation rosin, disproportionation rosin, polymerization rosin, and denaturation rosin, PENTA erythritol ester, etc., and as TERUPEN system resin Terpene resin, such as alpha-PINEN system, beta-PINEN system, and a JIPENTEN system, aromatic series denaturation terpene resin, TERUPEN phenol resin, hydrogenation terpene resin, etc. are mentioned. Also in these natural resins, the polymerization rosin from a viewpoint of the abrasion resistance of

a rubber constituent and the grip characteristic, TERUPEN phenol resin, and hydrogenation terpene resin which were blended are desirable.

[0016] The decomposition oil fraction which contains the unsaturated hydrocarbon which carries out subraw with petrochemical basic materials, such as ethylene and propylene, such as OREFIN and a JIORE fin, for example by the thermal cracking of the naphtha of petrochemical industry is obtained by said oil system resin polymerizing by a Friedel-Crafts catalyst with a mixture. As this oil system resin, it is C5 obtained by the thermal cracking of naphtha. Fatty series system petroleum resin obtained by polymerizing (\*\*) in a fraction, C9 obtained by the thermal cracking of naphtha Aromatic series system petroleum resin obtained by polymerizing (\*\*) in a fraction, Said C5 A fraction and C9 Oil system resin, such as styrene system resin, such as a copolymer of alicyclic compound system petroleum resin, such as copolymerization system petroleum resin, a hydrogenation system, and a JISHIKUROPENTAJIEN system, the styrene, substitution styrene and styrene which are obtained by carrying out the copolymerization of the fraction, and other monomers, is mentioned. C5 obtained by the thermal cracking of naphtha [ a fraction ] Usually, 1-pentene, 2-pen ten, 2-\*\*\*\*\*- 1-BUTEN, 2-\*\*\*\*\*- 2-BUTEN, JIORE fin system hydrocarbon, such as OREFIN system hydrocarbon, such as 3-\*\*\*\*\*- 1-BUTEN, 2-\*\*\*\*\*- 1, 3-butadiene, 1, 2-pen TAJIEN, 1, 3-pen TAJIEN, 3-\*\*\*\*\*- 1, and 2-butadiene, etc. is contained. Moreover, C9 [ a fraction / petroleum resin / which is obtained by polymerizing (\*\*) / aromatic series system ] C9 which is vinyltoluene and resin which polymerized the aromatic series of the carbon number 9 which makes INDEN main monomers, and is obtained by the thermal cracking of naphtha as an example of a fraction INDEN family objects, such as styrene family objects, such as alpha-methylstyrene, beta-MECHIRU styrene, and gamma-MECHIRU styrene, and INDEN, KUMARON, etc. are mentioned. As a brand name, there is PETOKORU made from PETOROJIN made from the Mitsui petrochemistry, Petra Ito made from the MIKUNI chemistry, the neo polymer made from the Nippon Oil chemistry, and Oriental soda etc.

[0017] Furthermore, the denaturation petroleum resin which denatured the petroleum resin which consists of said C9 fraction considers it as the resin which enables coexistence of grip nature and shop work nature, and is suitably used by this invention. C which denatured with the unsaturated alicyclic compound as denaturation petroleum resin -- C which denatured with the compound which has petroleum resin and a hydroxyl group 9 system -- C which denatured with petroleum resin and an unsaturated-carboxylic-acid compound 9 system -- petroleum resin etc. is mentioned 9 system.

[0018] As a desirable unsaturated alicyclic compound, cyclo pen TAJIEN, MECHIRU cyclo pen TAJIEN, etc. again as a Diels-Alder reaction output of ARUKIRU cyclo pen TAJIEN JISHIKUROPENTAJIEN, cyclo pen TAJIEN / MECHIRU cyclo pen TAJIEN codimerizaion thing, tricyclo pen TAJIEN, etc. are mentioned. Especially as an unsaturated alicyclic

compound used for this invention, JISHIKUROPENTAJIEN is desirable. the JISHIKUROPENTAJIEN denaturation C -- petroleum resin can be obtained by thermal polymerization etc. under existence of JISHIKUROPENTAJIEN and C9 fraction both 9 system. for example, the JISHIKUROPENTAJIEN denaturation C -- as petroleum resin, the product made from new Nippon Oil chemistry and neo polymer 130S are mentioned 9 system. [0019] Moreover, an alcoholic compound and a phenolic compound are mentioned as a compound which has a hydroxyl group. As an example of an alcoholic compound, the alcoholic compound which has double bonds, such as allyl alcohol, 2-butene-1, and 4 JIORU, is mentioned, for example. As a phenolic compound, ARUKIRU phenol, such as phenol, cresol, KISHIRENORU, p-t-butylphenol, p-octyl phenol, and p-nonylphenol, can be used. These \*\*\*\* machine content compounds may be used independently, and two or more sorts may be used together and used for them. moreover, the hydroxyl group content C -- [ petroleum resin ] 9 system after carrying out thermal polymerization of the acrylic acid (meta) ARUKIRU ester etc. and introducing an ester group into petroleum resin with an oil fraction After remaining or introducing a double bond into the method of returning this ester group, and petroleum resin, it can manufacture by the method of hydrating the double bond concerned etc. this invention -- the hydroxyl group content C -- although what is obtained by various kinds of methods as mentioned above can be used as petroleum resin 9 system, it is desirable to see from a performance side and a manufacture side and to use phenol denaturation petroleum resin etc. This phenol denaturation petroleum resin is obtained by carrying out cationic polymerization of the C9 fraction under existence of phenol, is easy to denature, and budget prices. for example, the phenol denaturation C -- as petroleum resin, the product made from new Nippon Oil chemistry and neo polymer E-130 are mentioned 9 system. [0020] furthermore, C9 system which denatured with the unsaturated-carboxylic-acid compound used by this invention -- petroleum resin -- C -- petroleum resin can be denatured by ethylenic unsaturated carboxylic acid 9 system. As a typical thing of this ethylenic unsaturated carboxylic acid, maleic acid (anhydrous), boletic acid, itaconic acid, tetrahydro (anhydrous) FUTARU acid, acrylic acid (meta), or Sitrah Cong acid is mentioned. unsaturated-carboxylic-acid denaturation C9 system -- petroleum resin -- C -- petroleum resin and ethylene system unsaturated carboxylic acid can be obtained by carrying out thermal polymerization 9 system. in this invention -- the maleic acid denaturation C -- petroleum resin is desirable 9 system. for example, the unsaturated-carboxylic-acid denaturation C -- as petroleum resin, the product made from new Nippon Oil chemistry and neo polymer 160 are mentioned 9 system. [0021] Moreover, C5 obtained by the thermal cracking of naphtha in this invention A fraction and C9 Copolymerization resin of a fraction can be used conveniently. It is C9 here. It is C9 obtained by the thermal cracking of naphtha although there was no restriction in particular as a fraction. It is desirable that it is a fraction. Specifically, TS30 of Struktol series by SCHILL&



SEILACHER, TS30-DL, TS35, and TS35-DL etc. is mentioned.

[0022] As said phenol system resin, ARUKIRU phenol formaldehyde system resin and its rosin denaturation object, ARUKIRU phenol acetylene system resin, denaturation ARUKIRU phenol resin, TERUPEN phenol resin etc. is mentioned and a brand name, KORESHIN (made by BASF A.G.), etc. which are the brand name which is specifically Novo Lacq type ARUKIRU phenol resin, HITANORU 1502 (made by Hitachi Chemical Co., Ltd.), and p-t-butylphenol acetylene resin are mentioned. Moreover, as Carboniferous system resin, coumarone-indene resin etc. is mentioned and xylene formaldehyde resins etc. are mentioned as xylene system resin. In addition, poly BUTEN can also be used as resin which has adhesion grant nature. Aromatic series system petroleum resin, phenol system resin, and coumarone-indene resin which are obtained from a viewpoint of the abrasion resistance of the blended rubber constituent and the grip characteristic by polymerizing (\*\*) in copolymerization resin of C5 fraction and C9 fraction and C9 fraction in these synthetic resins are desirable.

[0023] (C) As for resin of an ingredient, it is desirable that softening temperature is below 200 degrees C (measuring method: ASTM E28-58-T), and it is desirable that it is the range which is further 80-150 degrees C. If softening temperature exceeds 200 degrees C, the temperature dependence of the hysteresis loss characteristic may become high too much, and processability may be worsened. Moreover, at less than 80 degrees C, grip performance may be inferior. These viewpoints to softening temperature has the more desirable range of 90-120 degrees C.

[0024] Next, as the aforementioned (C) ingredient, a weight average molecular weight can use the liquefied polymer of 1,000-50,000. [ liquefied polymer means the polymer which has mobility at room temperature, and ] if a weight average molecular weight is above-mentioned within the limits The structure in particular is not limited, for example, chloroprene rubber (CR), styrene-butadiene rubber (SBR), butadiene rubber (BR), isoprene rubber (IR), styrene isoprene rubber (SIR), PORIISO butylene, etc. are mentioned. The styrene of low-molecular quantity and the copolymer of butadiene are [ among these ] comparatively desirable, for example, the weight average molecular weight of polystyrene conversion can use conveniently the styrene butadiene copolymer which is 5,000 to about 10,000. As concrete goods, it is poly butadiene which has a hydroxyl group at the molecule end, for example. It is poly butadiene which has a hydroxyl group at trademark R-15HT, R-45HT (product made from Idemitsu Petrochemistry), and the molecule end. It is poly butadiene which has a carboxyl group at a trademark G-1000, G-2000, G-3000, and the molecule end. It is poly butadiene which is a trademark C-1000 and simple poly butadiene and which has a hydroxyl group at the end with a trademark B-1000, B-2000, B-3000, and a hydrogenation type. Have a carboxyl group at the end with trademark GI-1000, GI-2000, GI-3000, and a hydrogenation type. Trademark BI-1000 which are trademark CI-1000 and hydrogenation type poly butadiene, BI-2000, and BI-3000

(made by Nippon Soda Co., Ltd.), They are trademark LIR-30 which are poly isoprene, LIR-50, and poly butadiene. It is trademark LIR-310 and the butadiene isoprene copolymer which are trademark LIR-300 and a styrene isoprene copolymer. Trademark LIR-403 which are trademark LIR-390 and hydrogenation isoprene and which are trademark LIR-200, LIR-290, and maleic anhydride denaturation poly butadiene, Trademark LIR-410, (Kuraray Make) which are maleic acid denaturation poly butadiene, Trademark RICON130MA8,130MA13,130MA20,131MA5,131MA10,131MA17,131MA20,156MA17,184MA6 which are maleic acid denaturation butadiene, trademark RICON130 which are poly butadiene, 131, 134, 142, 150, 152, 153,154,156,157, trademark RICON100,181,184 (made by Sartomer) that are a styrene butadiene copolymer, etc. are mentioned. Moreover, although various things can be compounded as suitable liquefied polymer for the (C) ingredient of this invention, a weight average molecular weight is suitable [ the styrene-butadiene rubber (SBR) of 9,300 etc. ] for the amount of vinyl combination of 26 mass % and a butadiene portion 53% for the amount of combined styrene in a molecule, for example. This SBR to cyclo HEKISAN 700ml as a solvent Styrene 5g, Add Butadiene 15g and NORUMARU butyl lithium as a polymerization initiator 3.2mmol, It is compoundable by using 2 and 6-G t-butyl p-cresol (BHT) as iso propanol and an antiaging agent as run pellet IZA as 2 and 2-bis(2-tetrahydro frill) propane 1mmol and a polymerization stop agent.

[0025] Moreover, as for resin or the liquefied polymer of a \*\* (C) ingredient, it is desirable to carry out 10 mass part -150 mass part combination to the rubber ingredient 100 mass part containing a copolymer (a) and (b). Above 10 mass parts, the addition effect of the (C) ingredient is fully discovered, and if it is below 100 mass parts, processability will not be worsened or it will not have a bad influence on abrasion resistance. Further 20 - especially 80 mass parts are desirable.

[0026] If containing a filler is the filler which can be used for the desirable and common rubber constituent as a filler, all can use the rubber constituent of this invention. Carbon black and an inorganic bulking agent can be mentioned, and, specifically, silica and the thing expressed with the following general formula (II) are desirable as an inorganic bulking agent.

$$mM1 \text{ and } xSiOy-zH2O \dots (II)$$

M1 among [type (II) Aluminum, magnesium, titanium, The oxide or hydroxide of the metal chosen from the group which consists of calcium and JIRUKONIUMU, and such metal, And as being chosen out of carbonate of those hydration things or such metal, are a kind as it is few, and [ m, x, y, and z ] You may contain bases, such as metal, such as] which is the integer of 1-5, the integer of 0-10, the integer of 2-5, and the integer of 0-10, respectively and also potassium, sodium, iron, and magnesium, and elements, such as fluoride,  $NH_4^-$ . [0027] Specifically An alumina 1 hydration thing (aluminum2 O3 and H2O), GIBUSAITO, Aluminium hydroxide [aluminum(OH)3], such as a buyer light, and carbonic acid aluminum [aluminum2

(CO<sub>3</sub>)<sub>2</sub>, Magnesium hydroxide [Mg(OH)<sub>2</sub>] and magnesium oxide (MgO), Magnesium carbonate (MgCO<sub>3</sub>), talc (3MgO, 4SiO<sub>2</sub>, and H<sub>2</sub>O), ATAPARUJAITO (5MgO, 8SiO<sub>2</sub>, and 9H<sub>2</sub>O), a white titanium pigment (TiO<sub>2</sub>), Titanium black (TiO<sub>2n-1</sub>), a calcium oxide (CaO), and calcium hydroxide [Ca(OH)<sub>2</sub>], Aluminum oxide magnesium (MgO-aluminum<sub>2</sub>O<sub>3</sub>), Clay (aluminum<sub>2</sub>O<sub>3</sub> and 2SiO<sub>2</sub>), Kaolin (aluminum<sub>2</sub>O<sub>3</sub>, 2SiO<sub>2</sub>, and 2H<sub>2</sub>O), a pie ROFI light (aluminum<sub>2</sub>O<sub>3</sub>, 4SiO<sub>2</sub>, and H<sub>2</sub>O), a vent night (aluminum<sub>2</sub>O<sub>3</sub>, 4SiO<sub>2</sub>, and 2H<sub>2</sub>O) and aluminum silicate (aluminum<sub>2</sub>SiO<sub>5</sub> --) Magnesium silicates (Mg<sub>2</sub>SiO<sub>4</sub>, MgSiO<sub>3</sub>, etc.), such as aluminum<sub>4</sub>, 3SiO<sub>4</sub>, and 5H<sub>2</sub>O, silicic acid calcium (Ca<sub>2</sub>SiO<sub>4</sub>, etc.), aluminum silicate calcium (aluminum<sub>2</sub>O<sub>3</sub>, CaO, 2SiO<sub>2</sub>, etc.), Magnesium silicate calcium (CaMgSiO<sub>4</sub>), calcium carbonate (CaCO<sub>3</sub>), A zirconium dioxide (ZrO<sub>2</sub>), zirconium hydroxide [ZrO(OH)<sub>2</sub> and nH<sub>2</sub>O], carbonic acid JIRUKONIUMU [Zr(CO<sub>3</sub>)<sub>2</sub>], various zeolite, feldspar, mica, the Mon Moliro night, etc. can be illustrated, and it is desirable that M1 is aluminum.

[0028] It is desirable that it is at least one chosen from the group which consists of carbon black, silica, alumina, and Clay as a filler used for this invention in the various above-mentioned fillers. There is no restriction in particular as carbon black, for example, SRF, GPF, FEF, HAF, ISAF, SAF, etc. are used, and 60 or more mg/g and JIBUCHIRU phthalate oil absorption (DBP) of carbon black (80ml / 100g or more) are [ the amount of iodine adsorption (IA) ] desirable. HAF, ISAF, and SAF which are further excellent in abrasion resistance although the improvement effect of grip performance and the destructive-proof characteristic becomes large by using carbon black -- it is especially desirable. Moreover, what has the external surface area by a CTAB adsorption process in the range which is 130-200m<sup>2</sup>/g also especially in these is desirable.

[0029] There is no restriction in particular also as silica, and For example, wet silica (water silicic acid), Dry type silica (anhydrous silicic acid), silicic acid calcium, aluminum silicate, etc. are mentioned, and the wet silica in which the coexistence effect of \*\*\*\*\* has most remarkable improvement effect, wet grip nature, and low \*\* of the destructive-proof characteristic is desirable also in these. Moreover, as for this silica, it is desirable that the specific surface area by a nitrogen adsorption process is in the range which are 80-300m<sup>2</sup>/g and further 100-220m<sup>2</sup>/g. It is because reinforcement nature with specific surface area sufficient above 80m<sup>2</sup>/g is demonstrated, and workability does not fall in being below 300m<sup>2</sup>/g. In addition, anhydrous silicic acid and water silicic acid of fine powder which are usually used as a white reinforcement bulking agent of rubber are used. Specifically, specific surface area can use commercial items, such as "Nipsil" (product made from Japanese Silica Industry) which is about 200m<sup>2</sup>/g, and "Zeosil 1115MP" (made by low DIA) whose specific surface area is 117m<sup>2</sup>/g.

[0030] Said alumina is expressed with the following general formula among what is expressed with the above-mentioned formula (II).

$\text{Al}_2\text{O}_3$  and  $n\text{H}_2\text{O}$  (however,  $n$  is 0 to 3 among a formula.)

As this inorganic filler, that particle diameter of 10 micrometers or less is desirable, and it is still more desirable that it is 3 micrometers or less. By the particle diameter of this inorganic filler being 10 micrometers or less, the destructive-proof characteristic of a vulcanization rubber constituent and abrasion resistance are maintainable good.

[0031] In this invention, one sort of this inorganic filler may be used and it may be used combining two or more sorts. Moreover, a filler is blended in a 10 - 250 mass part to a rubber ingredient 100 mass part, and 20 mass parts from a viewpoint of the improvement effect of reinforcement nature and many physical properties by it - its 150 mass parts are desirable. Under 10 mass parts are not enough as the improvement effects, such as the destructive-proof characteristic, and when 250 mass parts are exceeded, there is a tendency for the processability of a rubber constituent to be inferior.

[0032] The rubber constituent of this invention is oil which can blend crude rubber and/or other synthetic rubbers by request, and is used in the usual rubber industry, Antiaging agent, Vulcanizing agent, Vulcanization auxiliary agent, Rubber accelerator, Various kinds of medicine for rubbers, such as an antiscorching agent, can be blended suitably. Moreover, especially the rubber constituent of this invention is suitable as an object for high-speed-operation serious consideration type tires.

[0033]

[Example] Next, although a work example explains this invention in more detail, this invention is not limited at all by this example. In addition, evaluation of the rubber constituent was performed by the following methods.

(1) Use a weight average molecular weight Waters Co. make single distribution styrene polymer, The analytical curve was created beforehand in quest of the relation between the molecular weight of the peak of a gel permeation chromatography and the single distribution styrene polymer by (GPC), and the count number of GPC, and the molecular weight in polystyrene conversion of a polymer was calculated using this.

(2) The micro structure of the butadiene portion of a micro structure polymer was searched for by the infrared method, and the styrene unit content of the polymer was computed by the integration ratio of  $^1\text{H-NMR}$  (proton NMR) spectrum.

(3) The following rank was carried out and the metal mixer at the time of kneading of shop work nature resin compounded rubber and adhesion nature with a metal roll were evaluated. O (good) O\*\* (slightly good), \*\* (usually), \*\*-x (slightly bad), x (bad)

(4)  $\tan\delta$  at 50 degrees C was measured under the conditions of 1% of dynamic distortion using the viscoelasticity measurement testing machine by REOMETO Rix Corp. about the vulcanizate obtained by having vulcanized the rubber constituent blended based on hysteresis loss characteristic each work example. In addition, the value of control was set to 100 and it

indicated by the index.

(5) The grip nature of the grip characteristic tire evaluated the circuit by real-running. The grip performance set the value of control to 100, and indicated the reciprocal of the average value of the circumference time from the 10th round to the 20th round by the index. All show that grip performance is so high that a numerical value is large. In addition, the road surface evaluated by the dry grip characteristic of a dry state, and the wet grip characteristic of the state with a wet road surface.

[0034] Work example 1 (A) The weight average molecular weight  $1.0 \times 10^6$  of the polystyrene conversion by GPC, amount of combined styrene 30 mass %, The styrene butadiene (copolymer a) 100 mass part which is 50% of the amount of vinyl combination of a butadiene part, (B) The weight average molecular weight  $1.0 \times 10^4$  of the polystyrene conversion by GPC, amount of combined styrene 40 mass %, the liquefied \*\*\*\* liquid styrene butadiene (copolymer b) 40 mass part by which the double bond of the butadiene part was \*\*\*\*(ed) 90%, and (C) C5 A fraction and C9 Carry out the copolymerization of the fraction. The copolymerization system petroleum resin (made by Schill & Seilacher "SUTORAKUTORUTS30") 40 mass part obtained, Carbon black A (external surface area by a CTAB adsorption process:  $148 \text{ m}^2/\text{g}$ ) 24M4DBP oil absorption :  $102 \text{ ml} / 100 \text{ g}$  80 mass part, a stearic acid 2 mass part, A flower-of-zinc 3 mass part, an antiaging agent (N-1, 3 JIMECHI roux butyl N'-phenyl p-Feni range amine) 1 mass part, 0.4 mass part, 1 mass part, and a sulfur 1.5 mass part were mixed for two kinds of rubber accelerators (1 and 3-diphenyl guanidine and dibenzothiazyl disulfide), respectively, the rubber constituent was prepared, and the above-mentioned method estimated the hysteresis loss characteristic. Next, the tire of tire size:315/40R was created using the above-mentioned rubber constituent as tread rubber, and the dry grip characteristic and the wet grip characteristic were evaluated. Each evaluation result is shown in the 1st table. In addition, evaluation considered the comparative example 1 as control, and expressed it with the index.

[0035] Comparative example 1 (C) C5 A fraction and C9 The fraction was replaced with the copolymerization system petroleum resin obtained by carrying out copolymerization, and the rubber constituent was prepared like the work example 1 except having used the aroma tick oil ("AROMAKKUSU#3" by FUJI KOSAN, LTD.) which has the character as a softener.

[0036] The rubber constituent was prepared like the work example 1 except having used the adhesive grant resin indicated to the 1st table as a work-examples 2-9 (C) ingredient. An evaluation result is shown in the 1st table. In addition, evaluation considered the comparative example 1 as control, and expressed it with the index.

[0037] The rubber constituent was prepared like the work example 1 except having used the liquefied polymer indicated to the 1st table as a work-examples 10-15 (C) ingredient. An evaluation result is shown in the 1st table. In addition, evaluation considered the comparative example 1 as control, and expressed it with the index.

[0038]

[Table 1]

第1表-1

	実施例1	比較例1	実施例2	実施例3	実施例4
(A)成分 SBR <sup>*1</sup> (質量部)	100	100	100	100	100
(B)成分 水添SBR <sup>*2</sup> (質量部)	40	40	40	40	40
(C)成分 粘着付与性樹脂 (質量部)	C <sub>9</sub> /C <sub>9</sub> 共重合樹脂 <sup>*3</sup>	—	—	—	—
	フェノール樹脂A <sup>*4</sup>	—	40	—	—
	フェノール樹脂B <sup>*5</sup>	—	—	40	—
	DGPD樹脂 <sup>*6</sup>	—	—	—	40
	C8系樹脂 <sup>*7</sup>	—	—	—	—
	C <sub>9</sub> 系芳香族樹脂A <sup>*8</sup>	—	—	—	—
	C <sub>9</sub> 系芳香族樹脂B <sup>*9</sup>	—	—	—	—
	クマロンインデン樹脂A <sup>*10</sup>	—	—	—	—
	クマロンインデン樹脂B <sup>*11</sup>	—	—	—	—
アロマトイル <sup>*12</sup> (質量部)	—	40	—	—	—
カーボンブラックA <sup>*13</sup> (質量部)	80	80	80	80	80
ステアリン酸 (質量部)	2	2	2	2	2
亜鉛華 (質量部)	3	3	3	3	3
老化解防止剤 <sup>*20</sup> (質量部)	1	1	1	1	1
加硫促進剤A <sup>*21</sup> (質量部)	0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*22</sup> (質量部)	1	1	1	1	1
硫黄 (質量部)	1.5	1.5	1.5	1.5	1.5
ビスチリスロス	120	100	113	113	113
ドライグリップ特性	115	100	112	109	108
ウェットグリップ特性	109	100	106	105	104

[0039]

[Table 2]

第1表-2

	実施例5	実施例6	実施例7	実施例8	実施例9
(A)成分 SBR <sup>*1</sup> (質量部)	100	100	100	100	100
(B)成分 水添SBR <sup>*2</sup> (質量部)	40	40	40	40	40
(C)成分 粘着付与性樹脂 (質量部)	C <sub>9</sub> /C <sub>9</sub> 共重合樹脂 <sup>*3</sup>	—	—	—	—
	フェノール樹脂A <sup>*4</sup>	—	—	—	—
	フェノール樹脂B <sup>*5</sup>	—	—	—	—
	DGPD樹脂 <sup>*6</sup>	—	—	—	—
	C8系樹脂 <sup>*7</sup>	40	—	—	—
	C <sub>9</sub> 系芳香族樹脂A <sup>*8</sup>	—	40	—	—
	C <sub>9</sub> 系芳香族樹脂B <sup>*9</sup>	—	—	40	—
	クマロンインデン樹脂A <sup>*10</sup>	—	—	—	40
	クマロンインデン樹脂B <sup>*11</sup>	—	—	—	—
アロマトイル <sup>*12</sup> (質量部)	—	—	—	—	—
カーボンブラックA <sup>*13</sup> (質量部)	80	80	80	80	80
ステアリン酸 (質量部)	2	2	2	2	2
亜鉛華 (質量部)	3	3	3	3	3
老化解防止剤 <sup>*20</sup> (質量部)	1	1	1	1	1
加硫促進剤A <sup>*21</sup> (質量部)	0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*22</sup> (質量部)	1	1	1	1	1
硫黄 (質量部)	1.5	1.5	1.5	1.5	1.5
ビスチリスロス	118	121	119	118	119
ドライグリップ特性	111	114	113	113	114
ウェットグリップ特性	108	111	108	105	107

[0040]

[Table 3]

第1表-3

	実量部1C	実量部1E	実量部1E	実量部1E	実量部1E	実量部1E
(A)成分 SBR <sup>*1</sup> (質量部)	100	100	100	100	100	100
(B)成分 水素SBR <sup>*2</sup> (質量部)	40	40	40	40	40	40
(C)成分 液体ポリマー	ポリブタジエン <sup>*12</sup>	—	—	—	—	—
	ポリブタジエン <sup>*13</sup>	—	40	—	—	—
	ポリブタジエン <sup>*14</sup>	—	—	40	—	—
	ポリブタジエン <sup>*15</sup>	—	—	—	40	—
	ステレン-イソプレン共重合体 <sup>*16</sup>	—	—	—	—	40
	ステレン-ブタジエン共重合体 <sup>*17</sup>	—	—	—	—	40
アロマオイル <sup>*18</sup> (質量部)	—	—	—	—	—	—
カーボンブラック <sup>*19</sup> (質量部)	80	80	80	80	80	80
ステアリン酸 (質量部)	2	2	2	2	2	2
亜鉛華 (質量部)	3	3	3	3	3	3
硬化促進剤 <sup>*20</sup> (質量部)	1	1	1	1	1	1
加速促進剤 <sup>*21</sup> (質量部)	0.4	0.4	0.4	0.4	0.4	0.4
加速促進剤 <sup>*22</sup> (質量部)	1	1	1	1	1	1
炭素 (質量部)	1.5	1.5	1.5	1.5	1.5	1.5
ロステリンクロス	108	107	108	108	113	115
ドライグリップ媒体	107	106	105	103	108	112
ウェットグリップ媒体	105	103	102	102	104	109

- [0041] \*1 Styrene butadiene copolymer \*2 which is the weight average molecular weight 1.0x106 of the polystyrene conversion by GPC, amount of combined styrene 30 mass %, and amount of vinyl combination 50 mass [ of a butadiene part ] % The weight average molecular weight 1.0x104 of the polystyrene conversion by GPC, amount of combined styrene 40 mass %, Liquefied \*\*\*\* liquid styrene butadiene copolymer \*3 by which the double bond of the butadiene part was \*\*\*\*(ed) 90% Schill & Product made by Seilacher "SUTORAKUTORUTS30"
- \*4 "KORESHIN" by BASF A.G.
- \*5 Hitachi Chemical Co., Ltd. make Novo Lacq type ARUKIRU phenol resin "HITANORU 1502"
- \*6 JISHIKUROPENTAJIEN system resin by an exon chemical company "S KORETTSU 8180"
- \*7 "Hy Letts T500X" by Mitsui Chemicals, Inc.
- \*8 "FTR0120" by Mitsui Chemicals, Inc.
- \*9 The product made from New Nippon Oil Chemistry "neo polymer 140"
- \*10 "S KURON V120" by Nippon Steel Chemical Co., Ltd.
- \*11 The product made from Ouchi Shinko Chemical Industry "S KURON L-20"
- \*12 The product made from Idemitsu Petrochemistry "R-45HT"
- \*13 "G-2000" by Nippon Soda Co., Ltd.
- \*14 "Ricon153" by Sartomer
- \*15 "LIR-50" By Kuraray
- \*16 "LIR-310" By Kuraray
- \*17 "Ricon100" by Sartomer
- \*18 "AROMAKKUSU#3" by FUJI KOSAN, LTD.
- \*19 External surface area by a CTAB adsorption process : 24M4DBP oil absorption:102ml/148m2/g and 100g\*20 N-1, 3 JIMECHI roux butyl N-phenyl p-Feni range amine \*21 1, 3-diphenyl guanidine \*22 Dibenzothiazyl disulfide [0042] The same rubber

constituent as work-example 16 work example 1 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 2 as control. The result is shown in the 2nd table.

[0043] The same rubber constituent as work-example 17 work example 2 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 3 as control. The result is shown in the 2nd table.

[0044] Instead of work-example 18 carbon black A, it is carbon black B (external surface area by a CTAB adsorption process: 140m<sup>2</sup>/g J2). 24M4DBP oil absorption: Except having used 95ml / 100g, prepare a rubber constituent like a work example 2, and consider a comparative example 4 for evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic as control. It indicated by the index. The result is shown in the 2nd table.

[0045] The same rubber constituent as work-example 19 work example 7 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 5 as control. The result is shown in the 2nd table.

[0046] The same rubber constituent as work-example 20 work example 8 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 6 as control. The result is shown in the 2nd table.

[0047] The same rubber constituent as work-example 21 work example 11 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 7 as control. The result is shown in the 2nd table.

[0048] The same rubber constituent as work-example 22 work example 12 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 8 as control. The result is shown in the 2nd table.

[0049] Instead of work-example 23 carbon black A, except having used carbon black B, the rubber constituent was prepared like the work example 12, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip characteristic was indicated by the index by considering a comparative example 9 as control. The result is shown in the 2nd table.

[0050] The same rubber constituent as work-example 24 work example 15 was prepared, and the evaluation of the hysteresis loss characteristic, the dry grip characteristic, and the wet grip



characteristic was indicated by the index by considering a comparative example 10 as control. The result is shown in the 2nd table.

[0051]

[Table 4]

第2表-1

		実施例16	実施例17	実施例18	実施例19	実施例20
(A)成分	SBR <sup>*1</sup> (質量部)	100	100	100	100	100
(B)成分	水屈SBR <sup>*2</sup> (質量部)	40	40	40	40	40
(C)成分	粘着付与性樹脂 (質量部)	C <sub>6</sub> /C <sub>9</sub> 共重合樹脂 <sup>*3</sup>	40	—	—	—
		フェノール樹脂A <sup>*4</sup>	—	40	40	—
		C <sub>7</sub> 系芳香族樹脂B <sup>*5</sup>	—	—	—	40
		クマロンインデン樹脂A <sup>*6</sup>	—	—	—	40
		10	—	—	—	—
アロマオイル <sup>*10</sup> (質量部)		—	—	—	—	—
カーボンブラックA <sup>*10</sup> (質量部)		80	80	—	80	80
カーボンブラックB <sup>*23</sup> (質量部)		—	—	80	—	—
ステアリン酸 (質量部)		2	2	2	2	2
亜鉛華 (質量部)		3	3	3	3	3
老化防止剤 <sup>*20</sup> (質量部)		1	1	1	1	1
加硫促進剤A <sup>*21</sup> (質量部)		0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*22</sup> (質量部)		1	1	1	1	1
硫黄 (質量部)		1.5	1.5	1.5	1.5	1.5
ヒステリシスロス		119	116	115	113	112
ドライグリップ特性		114	113	113	110	110
ウェットグリップ特性		106	105	105	104	105

[0052]

[Table 5]

第2表-2

		比較例2	比較例3	比較例4	比較例5	比較例6
(A)成分	SBR <sup>*1</sup> (質量部)	100	100	100	100	100
(B)成分	水屈SBR <sup>*2</sup> (質量部)	—	—	—	—	—
(C)成分	粘着付与性樹脂 (質量部)	C <sub>6</sub> /C <sub>9</sub> 共重合樹脂 <sup>*3</sup>	40	—	—	—
		フェノール樹脂A <sup>*4</sup>	—	40	40	—
		C <sub>7</sub> 系芳香族樹脂B <sup>*5</sup>	—	—	—	40
		クマロンインデン樹脂A <sup>*6</sup>	—	—	—	40
		10	—	—	—	—
アロマオイル <sup>*10</sup> (質量部)		40	40	40	40	40
カーボンブラックA <sup>*10</sup> (質量部)		80	80	—	80	80
カーボンブラックB <sup>*23</sup> (質量部)		—	—	80	—	—
ステアリン酸 (質量部)		2	2	2	2	2
亜鉛華 (質量部)		3	3	3	3	3
老化防止剤 <sup>*20</sup> (質量部)		1	1	1	1	1
加硫促進剤A <sup>*21</sup> (質量部)		0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*22</sup> (質量部)		1	1	1	1	1
硫黄 (質量部)		1.5	1.5	1.5	1.5	1.5
ヒステリシスロス		100	100	100	100	100
ドライグリップ特性		100	100	100	100	100
ウェットグリップ特性		100	100	100	100	100

[0053]

[Table 6]

第2表-3

		実施例21	実施例22	実施例23	実施例24
(A)成分	SBR <sup>*1</sup> (質量部)	100	100	100	100
(B)成分	水添SBR <sup>*2</sup> (質量部)	40	40	40	40
(C)成分	液状ポリマー	40	-	-	-
	ポリブタジエン <sup>*13</sup>	-	-	-	-
	ポリブタジエン <sup>*14</sup>	-	40	40	-
	ステレン-ブタジエン共重合体 <sup>*17</sup>	-	-	-	40
アロマオイル <sup>*18</sup> (質量部)					
	-	-	-	-	-
カーボンブラックA <sup>*19</sup> (質量部)					
	80	80	-	80	-
カーボンブラックB <sup>*20</sup> (質量部)					
	-	-	80	-	-
ステアリン酸 (質量部)					
	2	2	2	2	2
亜鉛華 (質量部)					
	3	3	3	3	3
老化防止剤 (質量部)					
	1	1	1	1	1
加硫促進剤A <sup>*21</sup> (質量部)					
	0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*22</sup> (質量部)					
	1	1	1	1	1
硫黄 (質量部)					
	1.5	1.5	1.5	1.5	1.5
ヒステリシスロス					
	115	118	115	118	118
ドライグリップ特性					
	112	113	113	115	115
ウェットグリップ特性					
	108	109	108	110	110

[0054]

[Table 7]

第2表-4

		比較例7	比較例8	比較例9	比較例10
(A)成分	SBR <sup>*1</sup> (質量部)	100	100	100	100
(B)成分	水添SBR <sup>*2</sup> (質量部)	-	-	-	-
(C)成分	液状ポリマー	40	-	-	-
	ポリブタジエン <sup>*13</sup>	-	-	-	-
	ポリブタジエン <sup>*14</sup>	-	40	40	-
	ステレン-ブタジエン共重合体 <sup>*17</sup>	-	-	-	40
アロマオイル <sup>*18</sup> (質量部)					
	40	40	40	40	40
カーボンブラックA <sup>*19</sup> (質量部)					
	80	80	-	80	-
カーボンブラックB <sup>*20</sup> (質量部)					
	-	-	80	-	-
ステアリン酸 (質量部)					
	2	2	2	2	2
亜鉛華 (質量部)					
	3	3	3	3	3
老化防止剤 <sup>*21</sup> (質量部)					
	1	1	1	1	1
加硫促進剤A <sup>*22</sup> (質量部)					
	0.4	0.4	0.4	0.4	0.4
加硫促進剤B <sup>*23</sup> (質量部)					
	1	1	1	1	1
硫黄 (質量部)					
	1.5	1.5	1.5	1.5	1.5
ヒステリシスロス					
	100	100	100	100	100
ドライグリップ特性					
	100	100	100	100	100
ウェットグリップ特性					
	100	100	100	100	100

[0055] \*23 External surface area by a CTAB adsorption process : 140m<sup>2</sup>/g, 24M4DBP oil absorption:95ml / 100g [0056] In two to comparative example 10 work examples 16-24, it replaced with the copolymer (b) and the rubber constituent was prepared like work examples 16-24, respectively except having used the aroma tick oil ("AROMAKKUSU#3" by FUJI KOSAN, LTD.) which has the character as a softener. The evaluation result of the hysteresis loss characteristic, dry grip nature, and wet grip nature is shown in the 2nd table.

[0057] It is styrene butadiene rubber (a) like work examples 25-32 and comparative example 11 work example 1, As the weight average molecular weight 1.0x10<sup>6</sup> of the polystyrene

conversion by GPC, amount of combined styrene 30 mass %, the styrene butadiene copolymer that is 50% of the amount of vinyl combination of a butadiene part, and a \*\*\*\* copolymer (b) The weight average molecular weight  $1.0 \times 10^4$  of the polystyrene conversion by GPC, amount of combined styrene 40 mass %, Using the liquefied \*\*\*\* liquid styrene butadiene copolymer \*\*\*\*(ed) 90%, the double bond of the butadiene part performed rubber compounding and kneading according to combination of the 3rd table, and obtained the rubber constituent which blended the various resin shown in the 4th table. Under the present circumstances, the adhesion nature of kneading rubber and a roll was observed and shop work nature was evaluated.

[0058]

[Table 8]

第3表

混練り工程	配合内容	(質量部)
第一ステージ	ステレンブタジエン共重合体ゴム (a)	100
	水添ステレンブタジエン共重合体 (b)	80
	S A Fカーボンブラック	80
	亜鉛華	1.5
	ステアリン酸	2
	老化防止剤 6 C <sup>*20</sup>	1.5
第二ステージ	パラフィンワックス	1.5
	樹脂 (第4表、第7表に記載)	40
	亜鉛華	1.5
	加硫促進剤 DM <sup>*22</sup>	1.5
	加硫促進剤 CZ <sup>*24</sup>	2.5
	硫黄	1.5

[0059] \*24: Using N-cyclohexyl 2-benzothiazolylsulfenamide, next the above-mentioned rubber constituent as tread rubber, the tire of tire size:315/40R18 was produced, and the grip characteristic was evaluated. These results are shown in the 4th table. Evaluation considered the comparative example 11 as control, and expressed it with the index.

[0060]

[Table 9]

第4表

	比較例 11	実施例 25	実施例 26	実施例2 27	実施例 28	実施例 29	実施例 30	実施例 31	実施例 32
石油樹脂(質量部)	—	40	40	40	40	40	10	80	150
アロマオイル(質量部)	40	—	—	—	—	—	—	—	—
石油樹脂種類	—	A <sup>*9</sup>	B <sup>*25</sup>	C <sup>*26</sup>	D <sup>*27</sup>	E <sup>*28</sup>	C	C	C
軟化点℃	—	145	110	128	125	165	128	128	128
原料モノマー	—	C <sub>9</sub>	C <sub>9</sub> (α-ブチル)	C <sub>9</sub>	C <sub>9</sub>	C <sub>9</sub>	C <sub>9</sub>	C <sub>9</sub>	C <sub>9</sub>
変性剤	—	—	—	DCPD	フェノール	マレイニン酸	DCPD	DCPD	DCPD
グリップ特性	100	115	116	118	118	109	114	122	125
工場作業性	O	O	O	O	O~Δ	O	O	O	Δ

[0061]

\*25 B CRAY Product made by VALLEY "W110"

\*26 C Product made from New Nippon Oil Chemistry "neo polymer 130S"

\*27 D Product made from New Nippon Oil Chemistry "neo polymer E-130"

\*28 E Product made from New Nippon Oil Chemistry "neo polymer 160"

[0062] C from the result of Table 4 -- the grip characteristic and shop work nature are improved by denaturing petroleum resin 9 system -- especially -- the JISHIKUROPENTAJIEN denaturation C -- the tendency to excel in the work example 27 using petroleum resin much more 9 system is accepted.

[0063] The example 1 of manufacture [composition of styrene butadiene copolymer rubber (a-1)]

the 5l. autoclave with churning wings which fully carried out nitrogen substitution -- cyclo HEKISAN 3000g, the tetrahydro francs (THF) 12g and 1, 3-butadiene 200g, and Styrene 100g -- it introduced and the temperature in an autoclave was adjusted to 21 degrees C. Next, it polymerized for 60 minutes under \*\*\*\* conditions [ n-butyl lithium 0.10g ], and checked that the inversion rate of a monomer was 99%. Then, 3.5g of 2 and 6-G t-butyl p-cresol was added as an antiaging agent. An analytical value is shown in the 5th table.

The examples 2-8 of manufacture [styrene butadiene copolymer rubber (a-2) - (a-8) composition]

In the example 1 of manufacture, it compounded like the example 1 of manufacture except having changed the preparation ratio of a monomer, the amount of catalysts, etc. An analytical value is shown in the 5th table.

[0064]

[Table 10]

第5表

製造例	1	2	3	4	5	6	7	8
スチレン・ブタジエン共重合ゴム (a)	a-1	a-2	a-3	a-4	a-5	a-6	a-7	a-8
結合スチレン量 (質量%)	33	5	33	20	33	41	32	33
ビニル結合量 (%)	40	40	40	60	80	35	41	30
重量平均分子量 (× 10 <sup>4</sup> )	70	70	31	105	71	65	150	72

[0065] The example 9 of manufacture [composition of a \*\*\*\* styrene butadiene copolymer (b-1)]

Cyclo HEKISAN 3000g, the tetrahydro francs (THF) 12g and 1, 3-butadiene 150g, and Styrene 150g were introduced into the 5l. autoclave with churning wings which fully carried out nitrogen substitution, and the temperature in an autoclave was adjusted to 21 degrees C. Next, add n-butyl lithium 1.50g and it polymerizes for 60 minutes under \*\*\*\* conditions. After checking that the inversion rate of a monomer is 99%, adding tributyl silyl chloride 4.68g and suspending a polymerization, naphthenic acid nickel: beforehand prepared with another container -- triethyl ARUMINIMU: -- it becomes 1mol of nickel to 1000mol of butadiene parts in a copolymer about the catalytic liquid of butadiene =1:3:3 (molar ratio) -- as It taught. Then, hydrogen was

introduced by hydrogen pressure power 30atm in the system of reaction, and it was made to react at 80 degrees C. The rate of hydrogenation was computed from reduction of the spectrum of the unsaturated bonding link of the 100MHz proton NMR measured by the concentration of 15 mass %, using a carbon tetrachloride as a solvent. An analytical value is shown in the 6th table.

The examples 10-15 of manufacture [\*\*\*\* styrene butadiene copolymer (b-2) - (b-7) composition]

In the example 9 of manufacture, it compounded like the example 9 of manufacture except having changed the preparation ratio of a monomer, the amount of catalysts, hydrogen pressure power, etc. An analytical value is shown in the 6th table.

[0066]

[Table 11]

第6表

製造例	9	10	11	12	13	14	15
水素共重合体 (b)	b-1	b-2	b-3	b-4	b-5	b-6	b-7
結合スチレン量 (質量%)	50	48	50	22	33	50	48
重量平均分子量 ( $\times 10^4$ )	1.5	1.6	0.3	1.5	1.5	1.6	15
水素添加率 (%)	85	40	70	83	0	65	90

[0067] While using the styrene butadiene copolymer rubber (a) of the examples 1-8 of manufacture as work examples 33-38 and a comparative example 12 - 20 rubber ingredients, The \*\*\*\* styrene butadiene copolymer (b) by the examples 9-15 of manufacture was blended, rubber compounding and kneading were performed according to said combination of the 3rd table, and the rubber constituent was obtained. In addition, as resin used in this work example, Kind C was used altogether. Shop-work nature evaluation of this rubber constituent, and tire size which used this for the tread: Evaluation of the grip characteristic of 315/40R18 was performed like the above. A result is shown in the 7th table. About evaluation of the grip characteristic, it expressed with the index by considering a comparative example 12 as control.

[0068]

[Table 12]

第7表-1

	実施例 33	実施例 34	実施例 35	実施例 36	実施例 37	実施例 38
石油樹脂 (質量部)	40	40	40	40	40	40
石油樹脂種類****	C	C	C	C	C	C
スチレンブタジエン共重合体ゴム (a)	a-1	a-4	a-7	a-8	a-1	a-1
水素スチレンブタジエン共重合体 (b)	b-1	b-1	b-1	b-1	b-8	b-7
グリップ特性	115	113	112	110	110	113
工場作業性	○~△	○~△	○~△	○~△	○~△	○~△

[0069]

[Table 13]

第7表-2

	比較例 1,2	比較例 3	比較例 4,0	比較例 5	比較例 6	比較例 7	比較例 8	比較例 9	比較例 10
石油樹脂 (質量部)	—	—	—	—	—	—	—	—	—
アロマトイル (質量部)	4.0	—	—	—	—	—	—	—	—
石油樹脂 (質量部)	—	—	—	—	—	—	—	—	—
スチレンブタジエン共重合体 (a)	—	—	—	—	—	—	—	—	—
スチレンブタジエン共重合体 (b)	—	—	—	—	—	—	—	—	—
水添スチレンブタジエン共重合体	—	—	—	—	—	—	—	—	—
シリコン樹脂	—	—	—	—	—	—	—	—	—
工場作業性	—	—	—	—	—	—	—	—	—

[0070] The result of the 7th table shows that each work example is excellent in both grip nature and shop work nature compared with a comparative example. While 7.0x10<sup>5</sup> to 2.5x10<sup>6</sup> and the amount of combined styrene use especially the styrene butadiene copolymer rubber (a) whose amount of vinyl combination of ten to 50 mass % and a butadiene part is 20 to 70% as a rubber ingredient in a weight average molecular weight The tendency to excel in the work examples 33, 34, 35, 36, 37, and 38 using b-1 which satisfies the quality of a \*\*\*\* styrene butadiene copolymer (b), b-6, and b-7 much more is accepted.

[0071]

[Effect of the Invention] also when the rubber constituent of this invention makes temperature dependence small, and it uses for a tire, and tread skin temperature is low, while demonstrating good grip performance -- especially -- Denaturation C -- grip performance and shop work nature are simultaneously improvable further because it is with petroleum resin as a (C) ingredient 9 system.

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[Translation done.]